

MARCO DI FRANCESCO

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ONE PAGE CURRICULUM

- Born May 13 1975 (Pescara, Italy).
- **PhD in Mathematics** at the University of Roma "Tor Vergata" in **2004**.
- Current position: **Associate Professor** in Mathematical Analysis at the **University of L'Aquila (Italy)** since 18/05/2015.
- Formerly **Reader in Mathematics at the University of Bath** (2 years) and "**Ramon Y Cajal**" fellow at the Universitat Autònoma de Barcelona (1 year).
- Visiting positions at DAMTP University of Cambridge, IPAM UCLA, RICAM Linz.
- **P.I. of the FP7 People: Marie Curie Career Integration Grant**, Ref. 321957 "DifNonLoc - Diffusive Partial Differential Equations with Nonlocal Interaction in Biology and Social Sciences" from 2012 to 2014. Total funding: 100.000 Euro.
- Research field: **Partial Differential Equations**.
Main research topics: nonlocal aggregation-diffusion equations in biology and social sciences, nonlinear transport equations in traffic flow and pedestrian movements, optimal transport methods in PDEs, deterministic particle methods.
- 43 published papers (1 Duke Math J, 2 ARMA, 3 JDE, 4 SIAM Math Anal, 1 Calc Var PDE, 2 Nonlinearity), 645 total citations, H-Index = 15 (source: MathSciNet, 21 March 2019).
- Mentoring: 3 postdocs, 8 PhD students (4 co-supervision). One of them is now Assistant Professor.
- (Selected) Recent invited talks:
 - Mathematical Institute, University of Oxford, September 2018.
 - BIRS workshop "Entropies, the Geometry of Nonlinear Flows, and their Applications", April 2018, Banff. Video of the talk available at the link: <https://bit.ly/2TRUowK>
 - "Variational Methods for Evolution", November 2017, MFO Oberwolfach.
 - Winter School "CrossFields PDEs", Bedlewo (Poland), December 2016.
 - ICMS workshop "Gradient flows: from theory to application" - April, 2015.
- Organizer of the ESF (European Science Foundation) Research Conference "Applied Partial Differential Equations in Physics, Biology and Social Sciences: classical and modern perspectives" (Barcelona, 2012), of the Spring School "Microscopic descriptions and mean-field equations in physics and social sciences" (Bath 2014), of an ICMS Workshop in 2009, and several more scientific events.
- Italian "National Scientific Qualification" (ASN) as Full Professor in "Mathematical Analysis, Probability, and Statistics" (valid until 26/07/2024) and "Mathematical Physics" (valid until 13/07/2024).
- Teaching activity in short:
2005-2011: Calculus and analysis to undergraduate and graduate engineering courses.
2012-2014: PDEs and advanced analysis to graduate students in mathematics.
2014-2019: Functional analysis and biomathematics to graduate students in applied mathematics.
- Director of studies of an MSc course in applied mathematics at the University of Bath, President of a study course in applied mathematics at the University of L'Aquila.

EXTENDED CURRICULUM

POSITIONS

- 18/15/2015 – today: Associate Professor in Mathematical Analysis at the University of L'Aquila.
 - 01/10/2012 – 01/10/2014: Reader in Mathematics at the University of Bath (UK).
 - 01/09/2011 – 30/09/2012: "Ramon Y Cajal" fellow at the Universitat Autònoma de Barcelona (Spain).
 - 01/01/2009 – 31/12/2009: Senior Research Associate, at the Department of Applied Mathematics and Theoretical Physics (DAMTP), Centre for Mathematical Sciences, University of Cambridge.
 - 01/01/2005 – 31/08/2005: Research scientist at the Johann Radon Institute for Computational and Applied Mathematics (RICAM), Austrian Academy of Sciences (OEAW), Linz, Austria.
 - 01/01/2005 – 30/08/2011 and 01/10/2014 – 17/05/2015: Assistant Professor in Mathematical Analysis at the University of L'Aquila (Italy).
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RESEARCH GRANTS (as PI)

- 2012-2014: FP7 People: Marie Curie Career Integration Grant, Ref. 321957 "DifNonLoc - Diffusive Partial Differential Equations with Nonlocal Interaction in Biology and Social Sciences". Total funding: 100.000 Euro.
 - 2011-2012: MICINN-RYC ("Ramon Y Cajal" programme of the Spanish Ministry of Science and Innovation) "Partial Differential Equations in Biology, Medicine and Social Sciences". Ref. RYC-2010-06412. Total funding: 15.000 Euro.
 - 2012: ESF (European Science Foundation) grant for the organization of and ESF Research Conference. Title: "Applied Partial Differential Equations in Physics, Biology and Social Sciences: classical and modern perspectives", Venue: Centre de Recerca Matemàtica, Barcelona, Period: 2-7/09/ 2012. Total funding: 40.000 Euro.
 - 2018-2019: Grant awarded by the FFABR funding scheme of MIUR (Italian Ministry of University and Research). Total funding: 3000 Euro.
 - 2017: Grant awarded by the University of L'Aquila, in the context of a local funding scheme addressed to well-valued, unsuccessful EU applications (2016 ERC-Consolidator Grant with final score "B", ranking range 30-39%). Total funding: 18000 Euro.
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VISITING POSITIONS

- April 2008: Visiting at IPAM – UCLA during the "Optimal Transport" thematic programme.
- March/August 2007: Visiting post-doc at the Wolfgang Pauli Institute (WPI), Vienna, Austria.
- March/July 2006: Visiting post-doc at the Wolfgang Pauli Institute (WPI), Vienna, Austria.
- 01/01-31/03 2004: 'HYKE' (Hyperbolic and kinetic equations, EU training network) pre-doc fellowship, Universitat Autònoma de Barcelona (Spain).

- October – November 2002 and April – June 2003: Visiting PhD student at the Faculty of Mathematics of the University of Vienna, supported by the Wittgenstein 2000 prize of Peter A. Markowich.

RESEARCH ACTIVITY

My research activity deals with the analysis of Partial Differential Equations, particularly nonlinear diffusion equations, nonlocal aggregation-diffusion equations in biology and social sciences, nonlinear transport equations arising in traffic flow modelling and pedestrian movements, cross-diffusion and reaction-diffusion systems. I obtained results on

- the existence of solutions to aggregation-diffusion systems with many species,
- the convergence of the minimizing movement scheme in the Wasserstein space to a class of singular nonlocal interaction equations and systems,
- the emergence of singular (total collapse) behavior for nonlocal interaction equations and systems,
- the convergence of follow-the-leader particle schemes to nonlinear (local and nonlocal) transport equations,
- the variational structure and the contraction properties of nonlinear conservation laws in the Wasserstein space,
- the existence theory for the Hughes model for pedestrian movements,
- the emergence of non-trivial steady states for a class of aggregation-diffusion equations, partly extended to the 2-species case,
- the asymptotic behavior of a variant of the Keller-Segel model with prevention of overcrowding,
- the intermediate behavior of nonlinear diffusion equations lacking homogeneity and self-similarity,
- the fluid coupling of some nonlocal aggregation models
- the study of nonlinear diffusion and reaction-diffusion models via relative entropy methods.

I am currently leading a research group at the University of L'Aquila including Simone Fagioli (assistant professor), Antonio Esposito (post-doc), Emanuela Radici (post-doc), Yahya Jaafra (PhD student), Graziano Stivaletta (PhD student). My current and former collaborators include José A. Carrillo (Imperial College), Martin Burger (Erlangen), Peter Markowich (KAUST), Giuseppe Toscani (Pavia), Daniel Matthes (TU Munich), Massimiliano Rosini (Ferrara), Alessio Figalli (ETH Zurich).

PUBLICATIONS

Summary:

- 45 publications, with 41 articles published on journals indexed by the main internationally acknowledged databases (Scopus, ISI, MathSciNet), 1 book chapter, 1 proceedings, 2 arXiv preprint.
- Bibliometry: 645 total citations, H-Index = 15 (source: MathSciNet, 21 March 2019).

MOST RELEVANT PAPERS (in inverse chronological order):

1. **M. Di Francesco, S. Fagioli, and E. Radici**, *Deterministic particle approximation for nonlocal transport equations with nonlinear mobility* – Journal of Differential Equations, doi: 10.1016/j.jde.2018.08.047 (2018).
2. **M. Burger, M. Di Francesco, S. Fagioli, and A. Stevens**, *Sorting Phenomena in a Mathematical Model For Two Mutually Attracting/Repelling Species* - SIAM Journal on Mathematical Analysis, 50 (3), 3210–3250 (2018).
3. **M. Di Francesco, A. Esposito, and S. Fagioli**, *Nonlinear degenerate cross-diffusion systems with nonlocal interaction* - Nonlinear Analysis, Volume 169, 94-117 (2018).
4. **J. A. Carrillo, M. Di Francesco, and G. Toscani**, *Condensation phenomena in nonlinear drift equations*- Annali della Scuola Normale Superiore di Pisa Classe di Scienze, (5) 15, 145-171 (2016).
5. **M. Di Francesco and S. Fagioli**, *A nonlocal swarm model for predators–prey interactions*- Mathematical Models and Methods in Applied Sciences, 26 (319), 319-355 (2016).
6. **M. Di Francesco and M. D. Rosini**, *Rigorous derivation of nonlinear scalar conservation laws from follow-the-leader type models via many particle limit*- Archive for rational mechanics and analysis, 217 (3), 831-871 (2015).
7. **M. Di Francesco, M. Fornasier, J.-C. Hütter, and D. Matthes**, *Asymptotic Behavior of Gradient Flows Driven by Nonlocal Power Repulsion and Attraction Potentials in One Dimension* - SIAM Journal on Mathematical Analysis, 46 (6), 3814–3837 (2014).
8. **M. Di Francesco, and D. Matthes**, *Curves of steepest descent are entropy solutions for a class of degenerate convection-diffusion equations* – Calculus of Variations and Partial Differential Equations - 50, no. 1-2, 199–230 (2014).
9. **M. Di Francesco, and S. Fagioli**, *Measure solutions for nonlocal interaction PDEs with two species*- Nonlinearity 26, 2777-2808 (2013).
10. **M. Burger, M. Di Francesco, and M. Franek**, *Stationary states of quadratic diffusion equations with long-range attraction* – Communications in Mathematical Sciences 11, no. 3, 709–738 (2013).
11. **J. A. Carrillo, M. Di Francesco, A. Figalli, T. Laurent, and D. Slepcev**, *Global-in-time weak measure solutions and finite-time aggregation for nonlocal interaction equations*- Duke Mathematical Journal, 156 (2), 229-271 (2011).
12. **M. Di Francesco, P. A. Markowich, J.-F. Pietschmann, and M.-T. Wolfram**, *On the Hughes' model for pedestrian flow: The one-dimensional case*- Journal of Differential Equations, 250 (3), 1334-1362 (2011).
13. **M. Burger, M. Di Francesco, J.-F. Pietschmann, and B. Schlake**, *Nonlinear Cross-Diffusion with Size Exclusion*- SIAM Journal on Mathematical Analysis 42 (6), 2842-2871 (2010).
14. **M. Di Francesco, A. Lorz, and P. A. Markowich**, *Chemotaxis fluid coupled model for swimming bacteria with nonlinear diffusion: global existence and asymptotic behavior*- Discrete and Continuous Dynamical Systems (A), 28 (4), 1437--1453 (2010).
15. **M. Burger and M. Di Francesco**, *Large time behavior of nonlocal aggregation models with nonlinear diffusion*, Networks and Heterogeneous Media, 3 (4), 749-785 (2008).
16. **M. Di Francesco, K. Fellner, and P. A. Markowich**, *The entropy dissipation method for spatially inhomogeneous reaction-diffusion type systems*, Proceedings of the Royal Society A 464, 3273-3300 (2008).

17. **J. A. Carrillo, M. Di Francesco, and G. Toscani**, *Strict contractivity of the 2-Wasserstein distance for the porous medium equation by mass-centering*, Proceedings of the American Mathematical Society 135, 353-363 (2007).
18. **J. A. Carrillo, M. Di Francesco, and C. Lattanzio**, *Contractivity of Wasserstein metrics and asymptotic profiles for scalar conservation laws*, Journal of Differential Equations, 231 (2), 425-458 (2006).
19. **M. Burger, M. Di Francesco, and Y. Dolak-Struss**, *The Keller-Segel model for chemotaxis with prevention of overcrowding: linear vs. nonlinear diffusion*, SIAM Journal on Mathematical Analysis 38, 1288-1315 (2006).
20. **J. A. Carrillo, M. Di Francesco, and G. Toscani**, *Intermediate asymptotics beyond homogeneity and self-similarity: long time behavior for nonlinear diffusions*, Archive for Rational Mechanics and Analysis, 180 (1), 127-149 (2006).

SUPERVISION OF DOCTORAL STUDENTS AND POST-DOCTORAL RESEARCHERS

Post-docs:

- 01/10/2016 – today: Emanuela Radici (University of L'Aquila).
- 01/03/2015 - 01/11/2018: Simone Fagioli (University of L'Aquila).
- 05/03/2019 – today: Antonio Esposito (University of L'Aquila).

Supervision of PhD students

- Simone Fagioli (University of L'Aquila, he defended his thesis in February 2015. He later became post-doc in L'Aquila after a short period in the UK and is now Assistant Professor at the University of L'Aquila. I co-authored 9 papers with him)
- Antonio Esposito (University of L'Aquila, he defended his thesis in March 2019. I co-authored 2 papers with him)
- Yahya Jaafr (University of L'Aquila, currently year III student. I co-authored 1 paper with him)
- Graziano Stivaletta (University of L'Aquila, currently year II student. I co-authored 1 preprint with him)
- Jan-Frederik Pietschmann (University of Cambridge, co-supervision. He defended his thesis in 2011. I co-authored 2 papers with him during his PhD)
- Alexander Lorz (University of Cambridge, co-supervision. He defended his thesis in 2011. I co-authored 1 paper with him during his PhD)
- Marcus Wunsch (University of Vienna, co-supervision. He defended his thesis in 2009. I co-authored 1 paper with him during his PhD)
- Jesus Rosado (UAB Barcelona, co-supervision. He defended his thesis in 2010. I co-authored 1 paper with him during his PhD)

ORGANISATION OF SCIENTIFIC EVENTS (selection)

- ECMI (European Consortium for Mathematics in Industry) European Study Group for Industry (ESGI), Gran Sasso Science Institute, L'Aquila, 14-18 May 2018.

- Workshop "Aggregation-Diffusion PDEs: Variational Principles, Nonlocality and Systems" - Anacapri, 10-14 July, 2017.
- Mini-workshop "Optimal transport and PDEs in applied sciences", Gran Sasso Science Institute, L'Aquila, 6-7 April 2017.
- Workshop "Collective dynamics in gradient flows and entropy driven structures", 1-5 June 2015, Gran Sasso Science Institute, Gran Sasso Science Institute, L'Aquila.
- Spring School "Microscopic descriptions and mean-field equations in physics and social sciences", University of Bath, 12-16 May 2014.
- Ki-Net (NSF funded Network) workshop "Collective Behavior: Macroscopic versus Kinetic Descriptions". 19-23 May, 2014, Imperial College London.
- ESF (European Science Foundation) Research Conference "Applied Partial Differential Equations in Physics, Biology and Social Sciences: classical and modern perspectives", Centre de Recerca Matemàtica, Barcelona (Spain) September 2-7, 2012.
- ICMS (International Centre for Mathematical Sciences) workshop "Kinetic and Mean-field models in the Socio-Economic Sciences", July 2009, ICMS Edinburgh, Scotland.
- Organizer and member of the Scientific Committee of the WPI (Wolfgang Pauli Institute) Thematic Programme "Optimal transportation structures, gradient flows and entropy methods for Applied PDEs (2007)", Wolfgang Pauli Institute di Vienna (WPI), April – September 2007. The programme includes the organization of a conference and a summer school, both taking place in September 2007.

INVITATION TO CONFERENCES, SCHOOLS, SEMINARS (selection)

- Invited seminar at the Mathematical Institute, University of Oxford, 14 September 2018.
- Invited speaker at the "Interactive Workshop on Hyperbolic Equations", University of Ferrara, 10-12 September 2018.
- Invited speaker at the BIRS workshop "Entropies, the Geometry of Nonlinear Flows, and their Applications", 8-13 April 2018, BIRS Banff (Canada). Video of the talk available at the link:
<http://www.birs.ca/events/2018/5-day-workshops/18w5069/videos/watch/201804121400-DiFrancesco.html>
- Invitation at the MFO workshop "Variational Methods for Evolution", 12-18 November 2017, MFO Oberwolfach (Germany).
- Invited speaker at the conference "Workshop on PDEs: Modelling, Analysis and Numerical Simulation - PDE-MANS 2017", University of Granada (Spain), 19-23 June 2017.
- Mini-course at the Winter School "CrossFields PDEs", Bedlewo (Poland), within a Simons Semester at the Banach Center, 5-9 December 2016.
- Invited speaker at the conference "Forefront of PDEs: Modelling, Analysis and Numerics" - TU Vienna, 12-14 December 2016 (to honor the 60th anniversary of Peter A. Markowich).
- Invited speaker to the conference "ANalysis and Control on NETworks: trends and perspectives", 9-11 March 2016, University of Padua.
- Invited speaker to the conference "Gradient flows: from theory to application" - 20-24 April, 2015 - ICMS Edimburgh.
- Invited speaker to the Special session on "Mean-field models and control of multi-agent systems" at the 13th "Viennese Workshop on Optimal Control and Dynamic Games", 13-16 May 2015.

- Invited speaker at the Banff workshop “Entropy Methods, PDEs, Functional Inequalities, and Applications” (14w5109), Banff International Research Station, Banff, Canada, 29 June – 4 July, 2014.
- Invited seminar at MASS (Maths and Applications Sussex Seminar), University of Sussex, Brighton (UK), 31 March 2014.
- Invited seminar at the Applied PDEs seminar - Applied Mathematics and Mathematical Physics section, Imperial College, Londra (UK), 26 March 2014.
- Invited seminar at the Analisi Seminar, Università di Cardiff (UK), 24 February 2014.
- Invited seminar at the Analysis Seminar - School of Mathematics, University of Birmingham (UK), 11 December 2013.
- Invited seminar at the conference Mathematical topics in Kinetic Theory. University of Cambridge, 17-21 June 2013.
- Invited talk at the Banff workshop “Partial differential equations in the social and life science: emergent challenges in modeling, analysis, and computations”, Banff International Research Station, Banff (Canada), 31 March – 5 April, 2013.
- Invited seminar at the Ki-Net (NSF funded Network) conference “Transport Models for Collective Dynamics in Biological Systems”, 15 – 19 January, 2013, North Carolina State University, Department of Mathematics.
- Invited talk at the MFO workshop “Interplay of Analysis and Probability in Physics”, Mathematisches Forschungsinstitut Oberwolfach, 22-28 January, 2012.
- Invited seminar at the UIMP Summer School in Santander (Spain) “Frontiers of Mathematics and Applications”, August 2011.
- Invited seminar at the Thematic Programme “Partial Differential Equations in Kinetic Theories”, Isaac Newton Institute, Cambridge (UK), 16 August - 22 December 2010.
- Invited talk at the BIRS Workshop “Nonlinear Diffusions and Entropy Dissipation: From Geometry to Biology”, 9-14 May 2010, Banff, Canada.
- Invited seminar at the IPAM Optimal Transport Reunion Conference I, UCLA Conference Centre At Lake Arrowhead, 6-11 December 2009.
- Invited seminar at the Department of Bioengineering, Imperial College London, October 2009.
- Invited seminar at the Institute for Computational and Applied Mathematics, University of Muenster (Germany), 16 June 2009.
- Invited seminar at DAMTP, Cambridge (UK), May 2009.
- Invited seminar at the Workshop on Mathematical Methods and Modeling in Biophysical Phenomena, Angra dos Reis, IMPA Rio de Janeiro, Brasil, March 2009.
- Invited mini-course Gradient Flows on probability measures and applications to nonlocal interaction PDE’s, Department of Financial and Actuarial Mathematics, TU Vienna, November 2008.
- Invited seminar at the Workshop “Kinetic Equations: Direct and Inverse Problems”, Mantova, 15-18 May 2008.
- Invited seminar at the conference “Aspects of Optimal Transport in Geometry and Calculus of Variations”, IPAM, UCLA, 31 March – 4 April 2008.
- Invited seminar at DAMTP, Cambridge (UK), February 2008.
- Invited seminar at the Workshop “Partial Differential Equations, fluid dynamics and conservation laws”, Pisa, November 2007.
- Invited seminar at Equadiff 2007, TU Vienna, 5-11 August 2007.
- Invited seminar at CRM Centre de Recerca Matematica, Barcelona, Spain, March 2007.
- Invited mini-course at the WK Summer Camp 2007, Weißensee, Kärnten (Austria), July 2007.

- Invited seminar at IPERPD 2006, "XII incontro nazionale sui problemi di tipo iperbolico", September 2006.
- Invited seminar at the conferenza "Nonlinear PDEs: Homogenization and Kinetic Equations", Kreiskyforum, Vienna, Austria, 26-30 June, 2006.
- Invited seminar at the BIRS Workshop on Nonlinear diffusions: entropies, asymptotic behavior and applications, Banff, Canada, April 2006.
- Invited seminar at IPERPI 2004, "XI incontro nazionale sui problemi di tipo iperbolico", Pisa, October 2004.
- Invited seminar at the "Third meeting on Hyperbolic Conservation Laws: Recent results and Research perspectives", SISSA, Trieste, June 2004.
- Invited seminar at the conference IPERFE 2002, "X incontro nazionale sui problemi di tipo iperbolico", Ferrara (Italy), October 2002.
- Invited seminar at the conference IPERBS 2000 "VIII incontro nazionale sui problemi di tipo iperbolico", Brescia (Italy), December 2000.

OTHER RESEARCH ACTIVITIES

Referee: I regularly collaborate as referee with several scientific journals including Archive for Rational Mechanics and Analysis, Nonlinearity, Journal of Differential Equations, Mathematical Models and Methods in Applied Sciences, SIAM Journal of Mathematical Analysis, SIAM Journal of Applied Mathematics, Kinetic and Related Models, Journal of Mathematical Physics, Nonlinear Differential Equations and Applications, Applied Mathematics Letters, Monatshefte fuer Mathematik, Communications in Mathematical Sciences, Networks and Heterogeneous Media, ESAIM: Control, Optimisation and Calculus of Variations, Journal of the London Mathematical Society.

PhD defence committees

- Member of the PhD theses committee of Dr. Delyan Zhelyazov (Gran Sasso Science Institute) – 26 October 2018.
- Member of the PhD theses committee of Dr. Luca Alasio (University of Oxford) – 14 September 2018 – Supervisor Prof. Yves Capdebosq (University of Oxford) – Head of the committee Prof. Jan Kristensen.
- Head of the phd thesis committee of Dr. Mohamed Benyahia (Gran Sasso Science Institute) – 25 July 2018.
- Member of the PhD theses committee of Dr. Vo Anh Khoa (Gran Sasso Science Institute) – 16 January 2018.
- Member of the PhD theses committee of Dr. Daniel Balagué (Universitat Autònoma Barcelona) – 17 June 2013 – Supervisor Prof. José A. Carrillo (Imperial College) – Head of the committee: Prof. Cedric Villani.

Teaching activity

At the University of L'Aquila (2005-2011):

- 2004-2005: Course **Mathematical Analysis 1** - Architectural engineering, Faculty of engineering.
- 2005-2006, 2006-2007, 2007-2008, and 2008-2009: Course **Modelli Matematici per l'Ingegneria** – MSc degrees in Chemical Engineering, Telecommunication Engineering, Mathematical and Physical modelling for Engineering (in 2006-2009 for BSc and MSc in Civil Engineering as well). In 2007-2008 the course has been taught both in Italian and in English. In 2008-2009 the course has been taught only in English and partially included in the **Biomathematics** module (integrated with Principles of Biochemical Engineering), MSc degree in Biotechnological Chemical Engineering.
- 2006-2007: Tutorials for the course **Mathematical Analysis 3** – MSc degrees in Electrical Engineering, Computer Engineering, Telecommunication Engineering, Mathematical and Physical modelling for Engineering.
- 2006-2007 and 2008-2009: Course **Analisi Matematica 1** – Agro-industrial Engineering (Branch of the University of L'Aquila in Celano).
- 2007-2008: Course **Mathematical Analysis 3** – BSc degree in Electrical Engineering, MSc degrees in Telecommunication Engineering, Electrical Engineering, Design and Development of Industrial Products, Energetic systems Engineering, Computer engineering, Mathematical Engineering.
- 2007-2008: Course **Analytical and numerical methods for engineering** – BSc degrees in Electrical engineering and Telecommunication Engineering (partially included in the previous course).
- 2007-2008 and 2008-2009: Course **Mathematical models and methods for engineering** – BSc degree in Environmental Engineering (in 2008-2009 for the MSc degree in Electrical Engineering).
- 2007-2008: Course **Mathematical models in Engineering** (in English) – Joint degree in Mathematical Engineering, University of L'Aquila - TU Gdansk.
- 2008-2009: Course **Applied Partial Differential Equations** (in English) - Erasmus Mundus Master "MathMods" (joint with R. Pan, Georgia Tech).
- 2008-2009, 2009-2010, 2010-2011 and 2011-2012: Course **Mathematical Models in Life and Social Sciences** (in English) – MSc degree in Mathematical Engineering (starting from 2010 also for the "MathMods" Erasmus Mundus programme).
- 2009-2010: Tutorials for the course **Analisi Matematica 2** – All Faculty of Engineering BSc degrees.
- 2010-2011: Tutorials for the course **Analisi Matematica 1** – All Faculty of Engineering BSc degrees.

At the Universitat Autònoma de Barcelona (UAB) (2011-2012):

- 2011-2012: MSc Course **Applied Partial Differential Equations** (International Master Programme in Applied Mathematics).

At the University of Bath (2012-2014):

- 2012-2013 and 2013-2014: **Theory of Partial Differential Equations** (BSc and MSc in Mathematics).
- 2013-2014: 1st semester, **Methods for Differential equations** (MSc in Modern Applications of Mathematics)

My teaching activity at the University of Bath is documented in the attached title `titolo_director_of_studies_Bath_lettera_Graham.pdf`.

At the University of L'Aquila (2014-today):

- 2014-2015: **Mathematical Analysis II** for the bachelor's Degree in information engineering.
- 2014-2015, 2015-2016: **Functional Analysis in Applied Mathematics and Engineering** (including the module "Analisi Funzionale"), International Master's degree MathMods and Bachelor degree in Mathematics (in English).
- 2015-2016, 2016-2017, 2017-2018, and 2018-2019: **Biomathematics**, International Master's degree MathMods and MSc in Mathematics (in English).
- 2016-2017, 2017-2018: **Functional Analysis** (module), bachelor's degree in mathematics.

- 2016-2017, 2017-2018, and 2018-2019: **Functional Analysis in Applied Mathematics and Engineering**, International Master's degree MathMods (in English).

PhD courses:

- 2007-2008: Gradient flows on Wasserstein spaces – Dipartimento di Matematica Pura e Applicata, University of L'Aquila.
- 2012-2013: Gradient flows and systems of nonlocal interacting particles – Department of Mathematical and Statistical Sciences, University of Bath.
- A.A. 2015-2016: “A deterministic particles approach to conservation laws”, at Gran Sasso Science Institute.
- A.A. 2017-2018: “Aggregation-Diffusion equations”, at DISIM University of L'Aquila.

Supervision of MSc theses (selection)

- Donato Pera – Mathematical models for granular media (MSc degree in Mathematical Engineering, University of L'Aquila). Dr. Pera is now scientific calculus technician at DISIM, University of L'Aquila.
- Monika Twarogowska – Reaction-diffusion systems for cancer (MSc degree in Mathematical Engineering, University of L'Aquila). Dr. Twarogowska, whom I partially supervised during her PhD, has then held a post-doc position at the CNR-IAC institute M. Picone in Rome. She is now post-doctoral researcher at the Unité de Mathématiques Pures et Applications (UMPA) of the Ecole Normale Supérieure in Lyon (France).
- Simone Fagioli – Kinetic models in opinion formation (MSc degree in Mathematical Engineering, University of L'Aquila). Dr. Fagioli was my PhD student in mathematics at the University of L'Aquila and became assistant professor in L'Aquila on 02/11/2018.
- Yahya Jaafra – On nonlocal interaction models with nonlinear diffusion (MSc degree in Mathematics, University of L'Aquila). A.A. 2015-2016. Dr. Jaafra is now a PhD student in mathematics under my supervision.
- Hector Ibarra – Opinion models in closed communities by deterministic particle methods (International MSc degree “MathMods”, University of L'Aquila). A.A. 2016-2017.
- Graziano Stivaletta – A priori estimates and local and global existence for the fully parabolic Keller-Segel system for chemotaxis (MSc degree in Mathematics, University of L'Aquila). A.A. 2016-2017. Dr. Stivaletta is now a PhD student in mathematics under my supervision.

Administrative work

- 2018: *Director of studies* (Head of the “Consiglio di Area Didattica”) of the study course “Mathematical Engineering” (University of L'Aquila).
- 2016 – today: *Vice-director* of the study course Mathematical Engineering (University of L'Aquila).
- 2013-2014: *Director of Studies* of the MSc programme “Modern Applications of Mathematics”, University of Bath.
- 2018: **Member of the DISIM Department teaching committee** (University of L'Aquila).
- 2013-2014: **Member of the DLTQC (Department Learning and Teaching Quality Committee) at the Department of Mathematical Sciences, University of Bath.**
- 2017: Member of the DISIM Department committee for the evaluation of research and for internal regulations (University of L'Aquila).
- 2017: Member of the DISIM Department committee for the relationships with local schools (University of L'Aquila).
- 2018 – oggi: Member of the students' counseling committee of the study course in Mathematics (University of L'Aquila).
- 2016 – today: Member of the DISIM Department website editorial committee (University of L'Aquila).
- 2015-2016: Member of the VQR (Italian Research Quality Evaluation Framework) of the DISIM Department (University of L'Aquila).
- 2015-2016: University counseling in high-schools in Abruzzo (Italy) on behalf of the University of L'Aquila.

- 2014-2016: Member of the scientific committee of the University Library Service of the University of L'Aquila.
 - 2014-2015: Member of the University scientific committee (at the University of L'Aquila) for the awarding of a one-time subsidy to academic professors and researchers according to the Italian Law 240/2010 for the year 2012.
 - 2013-today: Member of the scientific board of the PhD programme "Mathematics and Modelling" at the University of L'Aquila.
 - 2008-2013: Member of the scientific board of the PhD programme "Mathematical and Physical Modelling in Engineering" at the University of L'Aquila.
 - 2013-2014: Member of the Faculty of Science Graduate School Committee at the University of Bath.
 - 2012-2014: "Personal tutoring" for 17 students (BSc e MSc) at the University of Bath.
 - 2007-2008 Coordinator of the bilateral Erasmus agreement between University of L'Aquila and Vienna University of Technology (coordinator in Vienna Prof. J. Teichmann).
 - 2006-2011: Administrative work as representing member of the mathematical area in the study course boards in Chemical Engineering, Telecommunication Engineering, Mathematical Engineering.
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L'Aquila, 22 March 2019

Marco Di Francesco